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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/541,568	05/01/2006	Li Jiang	57.0499 US PCT	1989

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EXAMINER	
BELL, BRUCE F	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/541,568	JIANG ET AL.	
	Examiner	Art Unit	
	Bruce F. Bell	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 July 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/03/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 22 and 23 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claims 22 and 23 do not further limit the apparatus features of the electrochemical sensor as set forth. Instead these recitations deal only with mounting the sensor in a wellbore. Since the well bore is not a part of the electrochemical sensor, these claims do not further the sensors structure and are therefore are objected to.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 19 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 19 is vague and indefinite with respect to the phrase "or its structural analogues". It is unclear to the examiner what the structure is of these analogues from the instant claim as set forth.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 2, 5, 10, 11, 13-18, 20, 21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Riseman et al (3915831) in combination with Buzza (4490234), Peng (2003/0033848) , Bahar (5499528), Susuki (4699892), Milco (5624546), Kiesele et al and Gamer et al (3988233).

Riseman et al disclose a improved gas sensing electrochemical cell for measuring dissolved hydrogen sulfide in a sample solution. The cell comprises a potentiometric sulfide ion sensitive electrode and a fluoride ion sensitive electrode, both in contact with an acid internal standard solution of an aqueous solution of a fluoride salt. A hydrophobic hydrogen sulfide gas permeable membrane separates the sample solution from the internal solution. See abstract. The electrochemical cell includes a sulfide electrode assembly 22 that includes a casing 24, one end of which is capped or closed with a pellet 26 of pure Ag_2S having a planar surface 28. The interior of the sulfide electrode assembly 22 is filled with a reference solution 20, of an aqueous saturated solution of AgCl and KCl and a reference electrode 31 of Ag/AgCl immersed therein. The reference electrode is connected to an external lead 32. Sulfide electrode 22 is disposed within the hollow enclosure 33. The sulfide sensing portion of the sulfide electrode within the enclosure 38 is in contact with a body of electrolyte 34. Membrane 36 which is permeable to H_2S is supported about its periphery by one side of spacer ring 38. The latter is sealed across an opening into enclosure 33 by elastomeric o-rings 40. Spacer ring 38 and o-ring 40 are dimensioned so that the membrane 36 is adjacent

to the planar surface 28 of the Ag_2S pellet 26, so that the interspace between surface 28 and membrane 36 has an extremely thing film of electrolyte. The membrane 36 is formed of a microporous hydrophobic material which is porous or gas permeable to H_2S and can readily diffuse therethrough. See col. 2, lines 33-63. During operation of the H_2S sensing cell, the potentiometric measurement of the change in sulfide ions in the thin film of electrolyte 34 between surface 28 and membrane 36 is caused by diffusion of the hydrogen sulfide through membrane 36. Hydrogen sulfide will diffuse in and out of electrolyte 34 until the partial pressure of the hydrogen sulfide on both sides of the membrane is equalized. See col. 3, line 61 – col. 4, line 2.

The prior art of Riseman et al fails to disclose the sensor being within a housing having a flow path.

Buzza disclose a method for measuring the concentration of a gas wherein the electrolyte solution is circulated between an electrode and a gas permeable membrane spaced from the electrode. See abstract. A sensing element 11 including an electrode 12 and a permeable membrane 13 is disclosed. A passage 14 and a passage 15 allow the electrolyte to flow between the electrode 12 and membrane 13. A flow cell 16 containing a sample substance premixed with acid to produce substance 17 which is to be measured is shown. Electrode 12 and membrane 13 are positioned adjacent flow cell 16. Passages 14 and 15 allow an electrolyte solution 18 to be pumped between electrode 12 and 13. The flow of electrolyte 18 is controlled by a valve 19. Sample substance 17 contacts membrane 13. The premixed substance 17 is pumped into the flow cell 16 and stopped adjacent member 13 such that the sample 17 contacts the

membrane 13. gas released from the sample substance diffuses through the membrane to react with the electrolyte solution 18. The internal reference solution in flow cell 16 before the sample substance 17 is pumped into the flow cell 16 is not equal to that of the electrolyte 18, which allows a continual diffusion of gas through the membrane 13. See col. 2, lines 32-60.

Peng disclose that electrochemical sensors that detect gases such as hydrogen sulfide may comprise either a two or three electrode system, wherein the electrodes are separated by an electrolyte. In operation, the working electrode potential is controlled with respect to the potential of a reference or counter electrode and the current output due to reaction of a gas at the working electrode is monitored. Electrochemical sensors need very little power to operate, are both sensitive, accurate and can be made specific to gases of interest. See paragraph 0004. The working electrode is made of a precious metal catalyst and the metal used is dependent on the type of gas sensor being employed. If the oxygen pressure and acidity are the same at both the working electrode and the reference electrode, the two electrodes will have equal potentials and there will be no current flowing through the electrodes, if they are connected electrically without applying a bias voltage. Many toxic gas sensors including H_2S sensors work on this principle. See paragraph 0032. All electrochemical gas sensors have gas access holes to allow gas to reach the working electrode, where upon the reactive gas is either reduced or oxidized or participates in or otherwise affects a redox reaction. Almost all electrochemical gas sensors are diffusion limited, i.e. the output of the sensor is controlled by the rate of diffusion through the diffusion barrier. The method of the

invention measures the sensors response to a change in the sensors sensitivity to the gas due to change in the gas diffusion path will be reflected by a change in the sensors response to the water vapor pressure change. The more restrictive the gas diffusion barrier, the smaller the sensors response to the air pressure change. See paragraph 0048. Example 1 shows that a three electrode system is used for the H_2S sensors of the invention.

Bahar disclose a central polymer tube of PEEK being used in a gas monitoring apparatus due to its ability to with stand hot gases being monitored. See abstract. The patent further shows other thermoplastic materials that maybe used in such a device such as that of PFTE, PP, PE and PEEK. See col. 2, line 64 – col. 3, line 15.

Suzuki disclose a composite membrane of a porous support and an ultrathin film of a zeolite formed as a surface layer on the porous support. See col. 2, lines 27-31. The ultra-thin zeolite film surface layer will have a different pore size depending on the type of zeolite used. See col. 2, lines 49-66. The composite membrane having a surface layer of an ultra-thin zeolite makes possible the continuous separation of hydrogen sulfide. See col. 4, lines 1-5.

Milco disclose an electrochemical cell for the detection of toxic gases wherein the working electrodes are made of an array of electrodes that comprise glassy carbon. See col. 5, lines 18-21.

Kiesele et al disclose an electrochemical gas sensor having a plurality of electrodes, an electrolyte and a gas permeable membrane, wherein the working electrode is a layer of boron doped diamond. See abstract and paragraph 0024. The

doped diamond electrode has advantages over the prior art electrodes in that it has excellent chemical stability and mechanical stability and long service life, and further is smooth and resistant to electrode fouling, and has unusually low residual current, which hardly increase even in case of changes in the temperature and moisture, so that lower gas concentrations can be determined. The electrodes also yield an extremely wide potential window and the formation of highly reactive hydroxide radicals make it possible to determine analytes that were not previously directly accessible to determination. See paragraphs 0026-0030.

Gamer et al disclose an apparatus for measuring dissolved gases in a fluid medium that includes a tubular member which is inserted in a pipeline through which fluid medium flows. This tubular member is a part of the pipeline and a portion of the inner wall surface thereof serves as a membrane through which the gas to be measured diffuses into the measuring cell which surrounds the tubular member and includes an annular electrolyte chamber and a cathode and anode electrodes therein. See abstract. The measuring cell 1 includes a tubular vessel 6 which is inserted through a flanged opening 14 into pipeline 2 through which flows the liquid containing the dissolved gas to be measured, a seal ring 16 being provided at the opening to prevent leakage of fluid from the pipe. A gas permeable membrane 4 is stretch across the lower end of the tubular vessel 6 within the pipeline 2 and a retaining ring 17 is seated in a peripheral groove provided in the wall of the tubular vessel and serves to stretch the membrane over the end. See col. 1, lines 45-64. An improved construction of the measuring device is shown in Figure 2 wherein the tubular member 212 is open at both ends 22, 23 and

has an inner diameter equal to that of the pipeline 2 is inserted into the line by means of couplings sleeves 15 overlapping the abutting ends of the tubular member and the corresponding ends of the pipeline, with sealing rings 16 being provided at the joints to prevent leakage from the pipeline. The wall of the central portion of the tubular member 21 is reduced in diameter so as to provide a relatively thin wall portion 3 that functions as the membrane component of the cell. The tubular member is made of a material that will enable the dissolved gas component in the liquid to diffuse into the electrolyte. Materials such as ceramics, polytetrafluoroethylene and sintered bodies with ceramics and metals may be used. See col. 4, lines 6-29.

The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the instant invention was made because even though the prior art of Riseman et al does not show such a sensor to include a flow path, the prior arts of Buzza, Peng and Gamer et al, all show that it is well known to incorporate a flow stream in combination with a sensor and further have some form of membrane or porous medium over the sensor to allow the gas to diffuse through the membrane or porous medium to get to the sensor electrodes for detection, monitoring or sensing of the gas in question. With respect to the pressure balancing it appears that this is conventional in the art as shown by the teaching in Riseman et al above. With respect to the membrane having a sealing means around the periphery of the membrane, the prior arts of Buzza and Gamer both show that this is conventional in the art also for these types of sensors. With respect to the three electrodes, the prior art of Peng shows that it is known in the

art to use either the two electrode or three electrodes in these types of gas sensors and Peng further discloses that with the H_2S, that a three electrode configuration is used. Further both Milco and Kiesele disclose the use of glassy carbon electrodes and boron doped diamond electrodes respectively and set forth that the smooth surfaces enable more stability, both mechanically and chemically and prolong service life. Reference electrodes of Ag/AgCl are conventional in the prior art electrochemical cells and are within the ability of the person having ordinary skill in the art. The use of a ferrocyanide or ferrocene is known in the art for its use as an electron acceptor or mediator and is used for the purpose of speeding up the reaction at the measuring electrodes and therefore is within the ability of the person having ordinary skill in the art. Since Peng recognizes that these types of sensors can be made specific to certain gases being detected and in view of the prior arts showing various aspects of the electrodes, membranes, etc that are used in these types of electrochemical sensors, one having ordinary skill in the art would have recognized how to adapt the sensor of Riseman et al to be used in a flow path such as in Buzza and Gamer et al and would have used the necessary electrodes and membranes necessary to detect hydrogen sulfide as shown in the remaining references presented above. Therefore, the instant claims as recited are obvious in view of the teachings of Riseman et al, Buzza, Peng, Bahar, Suzuki, Milco, Kiesele et al and Gamer et al for the reasons set forth above with respect to the instant claims as presented.

Double Patenting

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the

unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1-24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-27 of U.S. Patent No. 7,407,566. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the patent encompass those of the instant invention. Even though all the specifics are not shown in the patented claims, these claims caused the examiner to look to the specification of the patent for the purpose of seeing how the apparatus was made. In doing so, it was found that the figures and col. 4, lines 15-18, 25-28 and col. 8, line 12 – col. 9, line 2, set forth the applicants instant invention as presently claimed. Therefore the obviousness type double patenting is proper.

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct

from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1-4, 10, 14, 15 and 24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,939,717. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claim of the patent encompasses that of the instant invention as presented. Even though the specifics are not shown in the patented claim, the examiner was motivated by the patented to claim to look to the patented specification to find out the specifics of the sensor structure. In doing so, it was found that the structure of the patented sensor and that of the instant sensor was the same as can be seen at col. 18, line 47 – col. 19, line 48. The recitations in the instant claims with respect to the piston and the pressure balancing are disclosed at col. 10, line 61 – col. 11, line 44 and the recitations in the claims with respect to the electrodes and materials they are made of, is disclosed at col. 12, lines 18-36. Therefore the obviousness type double patenting is proper.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bruce F. Bell whose telephone number is 571-272-1296. The examiner can normally be reached on Monday-Friday 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BFB
May 20, 2009

/Bruce F. Bell/
Primary Examiner, Art Unit 1795